

1. A web inspection method comprising:

projecting light from a source to be incident on a select portion of a web that is moving in a down-web direction and that extends laterally to define a width in a cross-web direction;

capturing reflected light from said source that is reflected by said select web portion and deriving a digital image of said reflected light;

simultaneously with said step of capturing reflected light, capturing transmitted light from said source that is transmitted through said select web portion and deriving a digital image of said transmitted light;

digitally merging said reflected light digital image and said transmitted light digital image to derive merged image data that represent both said reflected light and said transmitted light; and,

using said merged image data to identify defects in said web.

2. The method as set forth in claim 1, further comprising using said reflected light digital image and said transmitted light digital image together with said merged image data to identify defects in said web.

3. The method as set forth in claim 1, wherein said step of capturing reflected light comprises using a reflected light image capturing camera system and wherein said step of capturing transmitted light comprises using a transmitted light image capturing camera system, and wherein said web is located between said reflected light image capturing system and said transmitted light image capturing system.

4. The method as set forth in claim 3, wherein said light source and said reflected light image capturing system are located on a first side of said web and wherein said transmitted light image capturing system is located on a second side of said web that is opposite said first side so that said web passes between said light source and said transmitted light image capturing system.

5. The method as set forth in claim 4, wherein said reflected light image capturing system and said transmitted light image capturing system are registered with each other in terms of a field of said web imaged respectively thereby so that said reflected light image capturing system and said transmitted light image capturing system simultaneously image said select web portion where said light from said source is incident thereon.

6. The method as set forth in claim 5, wherein said reflected light image capturing system comprises a plurality of reflected light imaging cameras and wherein said transmitted light image capturing system comprises a plurality of transmitted light imaging cameras, and wherein each of said reflected light imaging cameras corresponds to and is registered with one of said transmitted light imaging cameras so as to define a corresponding pair of imaging cameras.

7. The method as set forth in claim 6, wherein said reflected light imaging cameras have respective imaging fields that overlap each other in a cross-web direction and wherein said transmitted light imaging cameras have respective imaging fields that overlap each other in the cross-web direction.

8. The method as set forth in claim 6, wherein said light source comprises a fiber-optic light line.

9. The method as set forth in claim 8, wherein each of said reflected light cameras and each of said transmitted light cameras comprises a line-scan CCD camera.

10. The method as set forth in claim 9, wherein said reflected light cameras are registered with each other in terms of a down-web portion of said web being imaged respectively thereby so that said reflected light imaging cameras cooperate to image a single uninterrupted $1 \times m$ pixel row of said web, where m is the resolution of pixels used to image an entire cross-web dimension of said web.

11. The method as set forth in claim 10, wherein said transmitted light cameras are registered with each other in terms of a down-web portion of said web being imaged respectively thereby so that said transmitted light imaging cameras cooperate to image a single uninterrupted $1 \times m$ pixel row of said web, where m is the resolution of pixels used to image an entire cross-web dimension of said web.

12. The method as set forth in claim 1, further comprising:

after said step of using said merged image data to identify defects in said web, and without interrupting movement of said web in said down-web direction, marking said web at or near all identified defects.

13. The method as set forth in claim 1, further comprising:
after said step of using said merged image data to identify defects in said web, culling defects from said web.

14. The method as set forth in claim 1, wherein said select portion of said web is an unsupported free-span portion of said web that extends between first and second web supports.

15. The method as set forth in claim 14, wherein said first and second web supports each comprise an idler roll.

16. The method as set forth in claim 14, wherein said web moves in said down-web direction while being maintained under a select tension.

17. The method as set forth in claim 16, wherein said select tension is at least one pound of tension for each inch of said width of said web.

18. The method as set forth in claim 4, wherein said light projected from said source is incident on said web at an angle of x degrees relative to a vertical plane, said reflected light image capturing system is located at an angle y relative to said vertical plane, and wherein said transmitted light image capturing system is directly aligned with said projected light.

19. A web inspection apparatus comprising:

first and second web supports for movably supporting an associated web moving in a down-web direction;

a light source that outputs a light pattern adapted to be incident on a select free-span, unsupported portion of the associated web located between the first and second web supports;

a reflected light image capturing system for imaging the select portion of the associated web based upon light from said source reflected by the select web portion;

a transmitted light image capturing system for imaging the select portion of the associated web based upon light from said source transmitted through the select portion, wherein said reflected light image capturing system is registered with said transmitted light image capturing system so that said reflected light image capturing system and said transmitted light image capturing system are adapted to simultaneously image the select portion of the associated web in terms of reflected and transmitted light, respectively.

20. The apparatus as set forth in claim 19, wherein said light pattern output by said light source is aimed directly into said transmitted light image capturing system.